FIG. 1

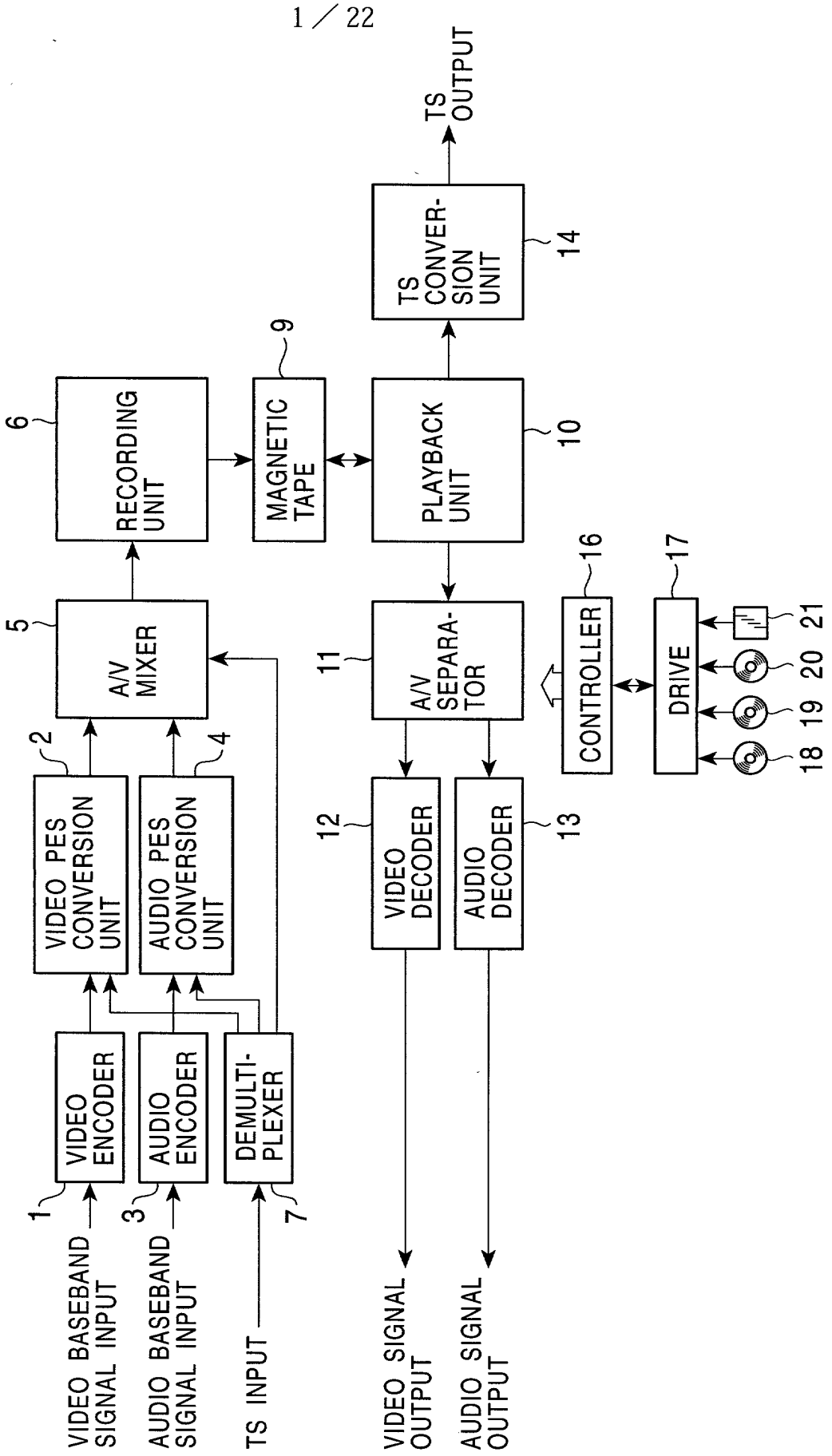
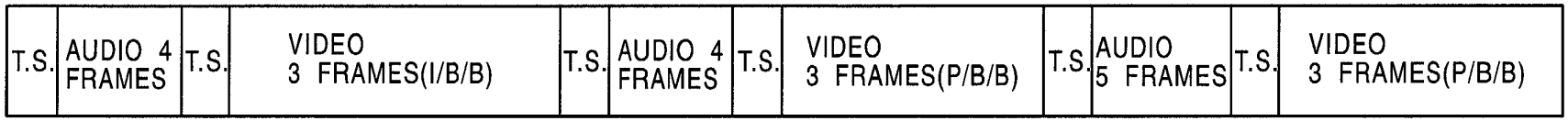


FIG. 2



T.S. : TIME STAMP

FIG. 3


AUDIO PES
4 FRAMES
VIDEO PES
3 FRAMES(I/B/B)
AUDIO PES
4 FRAMES
VIDEO PES
3 FRAMES(P/B/B)
AUDIO PES
5 FRAMES
VIDEO
3 FRAMES(P/B/B)

FIG. 4

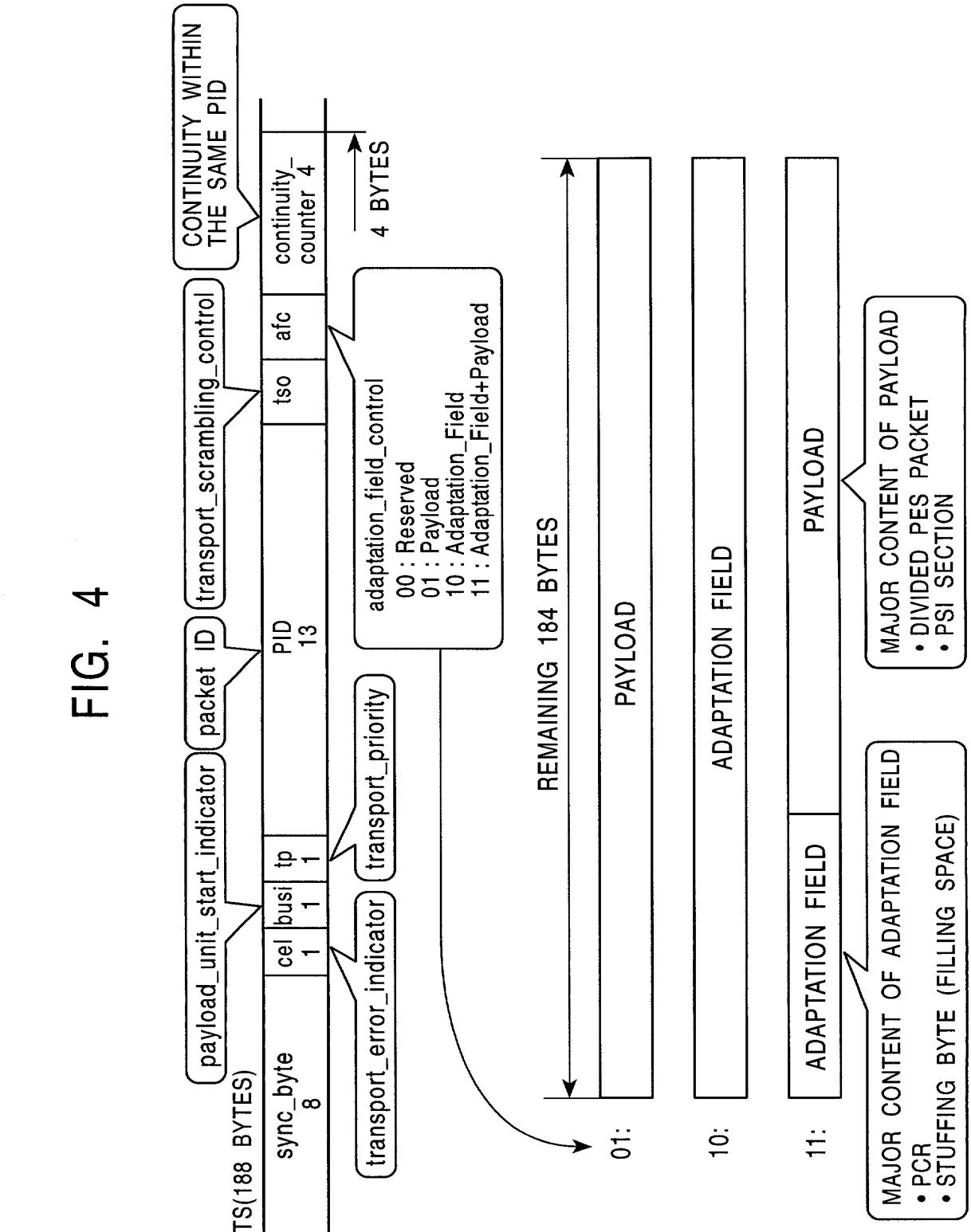

TS PACKETS(188 BYTES)
sync_byte 8
cel 1
busi 1
tp 1
PID 13
tso
afc
continuity_ counter 4
payload_unit_start_indicator
packet ID
transport_scrambling_control
CONTINUITY WITHIN THE SAME PID
4 BYTES
transport_error_indicator
transport_priority
adaptation_field_control
00 : Reserved
01 : Payload
10 : Adaptation_Field
11 : Adaptation_Field+Payload
REMAINING 184 BYTES
01:
PAYLOAD
10:
ADAPTATION FIELD
11:
ADAPTATION FIELD
PAYLOAD
MAJOR CONTENT OF ADAPTATION FIELD
• PCR
• STUFFING BYTE (FILLING SPACE)
MAJOR CONTENT OF PAYLOAD
• DIVIDED PES PACKET
• PSI SECTION

FIG. 5

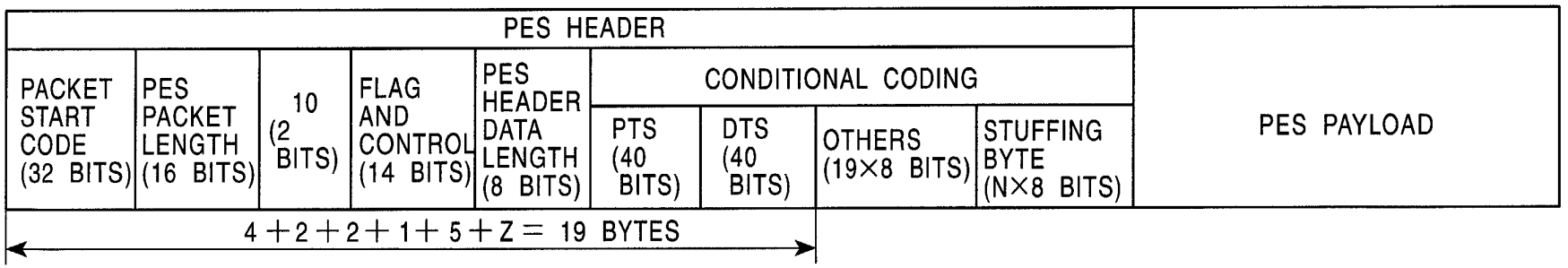

PES HEADER
PACKET START CODE (32 BITS)
PES PACKET LENGTH (16 BITS)
10 (2 BITS)
FLAG AND CONTROL (14 BITS)
PES HEADER DATA LENGTH (8 BITS)
CONDITIONAL CODING
PTS (40 BITS)
DTS (40 BITS)
OTHERS (19×8 BITS)
STUFFING BYTE (N×8 BITS)
PES PAYLOAD
4 + 2 + 2 + 1 + 5 + Z = 19 BYTES

FIG. 6

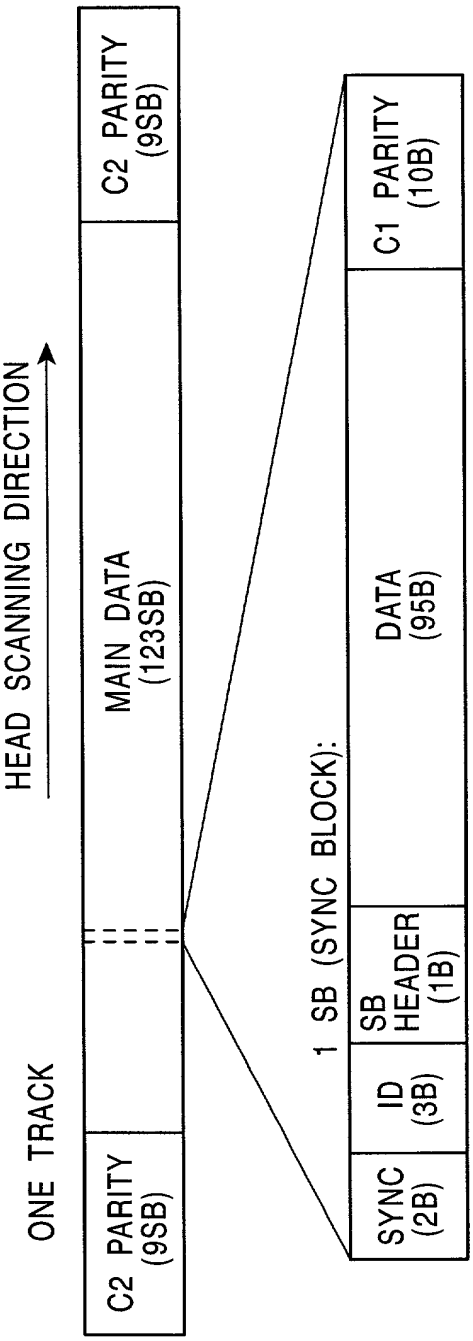
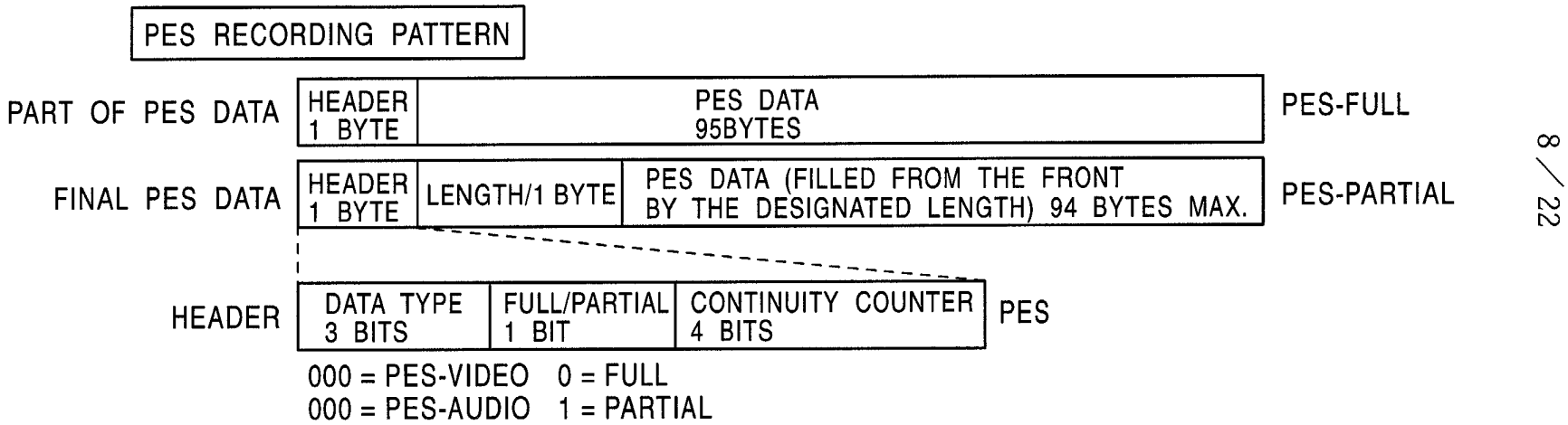

HEAD SCANNING DIRECTION
ONE TRACK
C2 PARITY (9SB)
MAIN DATA (123SB)
C2 PARITY (9SB)
1 SB (SYNC BLOCK):
SYNC (2B)
ID (3B)
SB HEADER (1B)
DATA (95B)
C1 PARITY (10B)

FIG. 7

BIT-7	BIT-6	BIT-5	BIT-4	BIT-3	BIT-2	BIT-1	BIT-0
←-------- DATA TYPE --------→							
0	PES-VIDEO		FULL/PARTIAL	CONTINUITY COUNTER			
1	PES-AUDIO		FULL/PARTIAL	CONTINUITY COUNTER			
2	SEARCH-DATA		VIDEO/AUDIO	SEARCH SPEED			RESERVED
3	AUX		AUX MODE			RESERVED	
4	TS-1		RESERVED		TIME STAMP		
5	TS-2		CONTINUITY COUNTER				
6	NULL		RESERVED				
7	RESERVED		RESERVED				

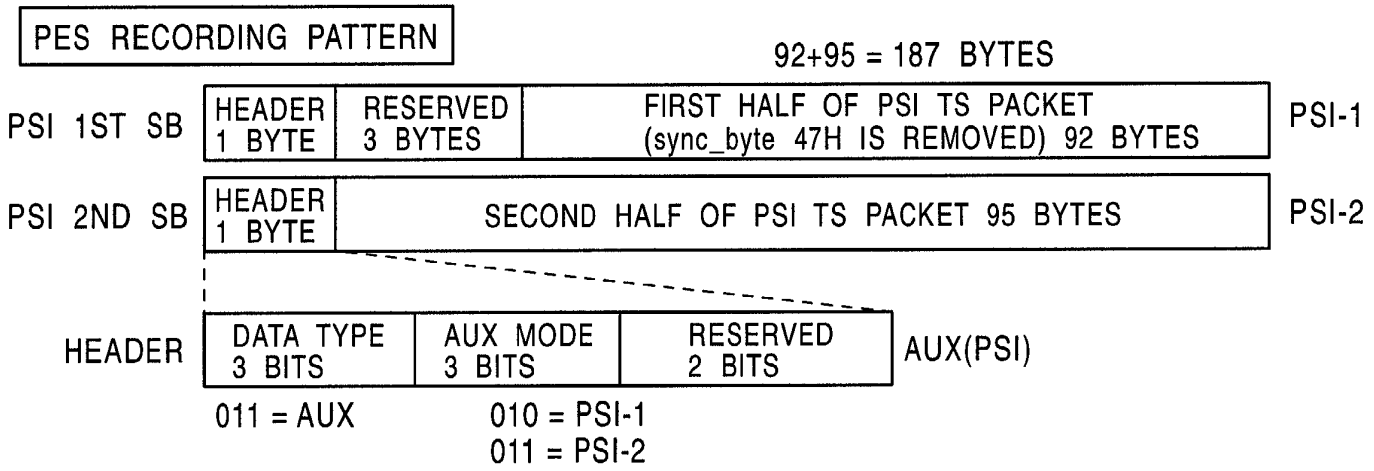
AUX MODE
0 : AUX-V
1 : AUX-A
2 : PSI-1
3 : PSI-2
4 : SYSTEM
5-7 : RESERVED

FIG. 8



CONTINUITY COUNTER :
BY USING CYCLIC COUNTER INDEPENDENTLY FOR PES-VIDEO AND PES-AUDIO, IT CAN BE IDENTIFIED THAT THE SAME TYPE OF SB IS CONTINUOUS

FIG. 9



IN PES RECORDING MODE, RECEIVED PSI (PAT/PMT/SIT)
TS PACKET IS DIVIDED AND RECORDED IN TWO SBS AS AUX

FIG. 10

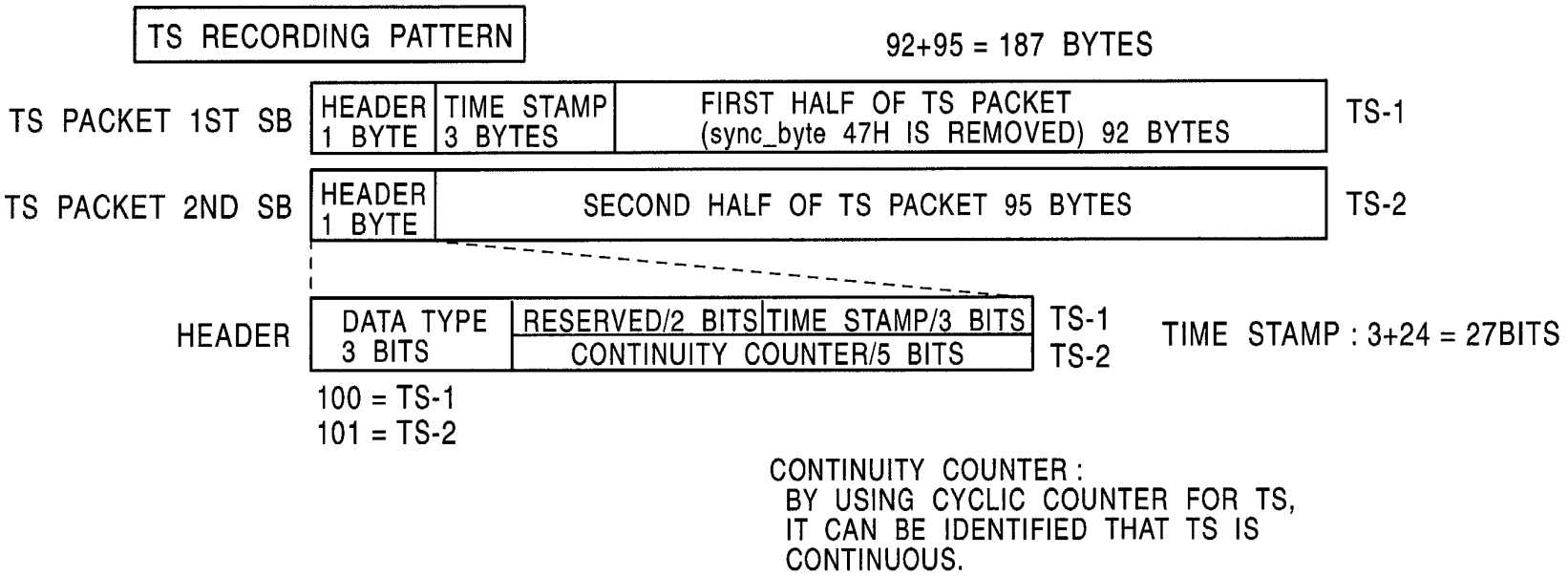

TS RECORDING PATTERN
92+95 = 187 BYTES
TS PACKET 1ST SB
HEADER 1 BYTE
TIME STAMP 3 BYTES
FIRST HALF OF TS PACKET (sync_byte 47H IS REMOVED) 92 BYTES
TS-1
TS PACKET 2ND SB
HEADER 1 BYTE
SECOND HALF OF TS PACKET 95 BYTES
TS-2
HEADER
DATA TYPE 3 BITS
RESERVED/2 BITS
TIME STAMP/3 BITS
CONTINUITY COUNTER/5 BITS
TS-1
TS-2
TIME STAMP : 3+24 = 27BITS
100 = TS-1
101 = TS-2
CONTINUITY COUNTER :
BY USING CYCLIC COUNTER FOR TS,
IT CAN BE IDENTIFIED THAT TS IS
CONTINUOUS.

FIG. 11

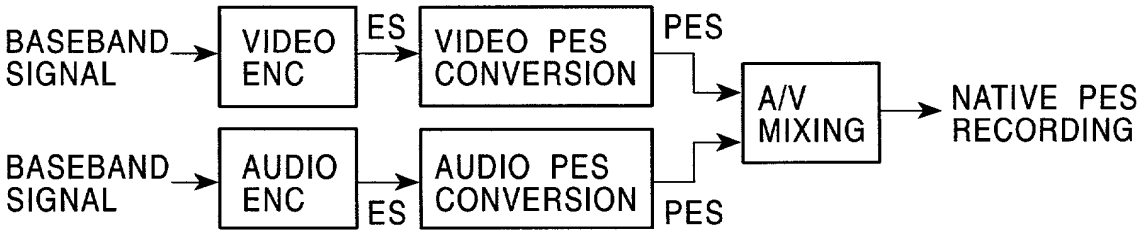

BASEBAND SIGNAL
VIDEO ENC
ES
VIDEO PES CONVERSION
PES
BASEBAND SIGNAL
AUDIO ENC
ES
AUDIO PES CONVERSION
PES
A/V MIXING
NATIVE PES RECORDING

FIG. 12

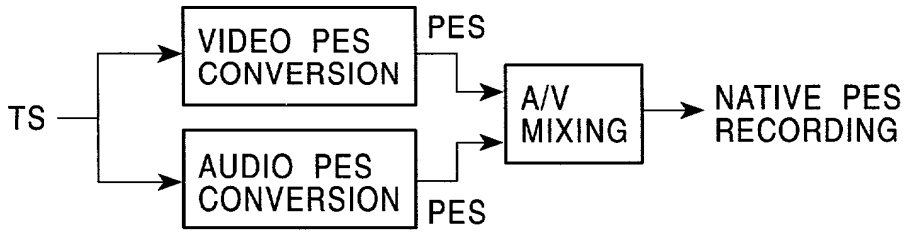

TS
VIDEO PES CONVERSION
PES
AUDIO PES CONVERSION
PES
A/V MIXING
NATIVE PES RECORDING

FIG. 13

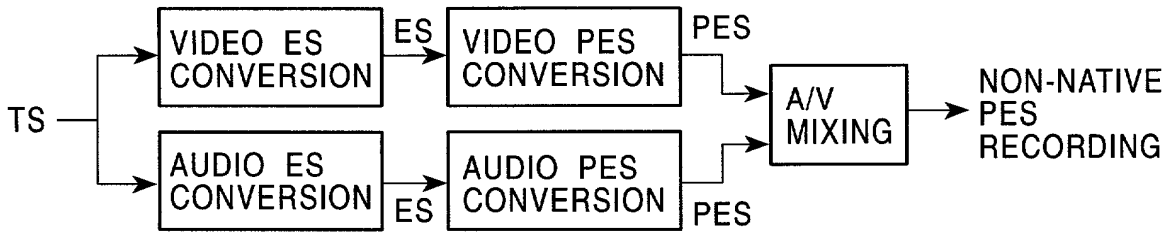

TS
VIDEO ES CONVERSION
ES
VIDEO PES CONVERSION
PES
AUDIO ES CONVERSION
ES
AUDIO PES CONVERSION
PES
A/V MIXING
NON-NATIVE PES RECORDING

FIG. 14

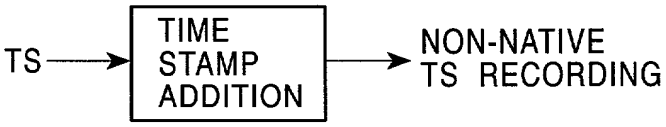

TS
TIME STAMP ADDITION
NON-NATIVE TS RECORDING

FIG. 15

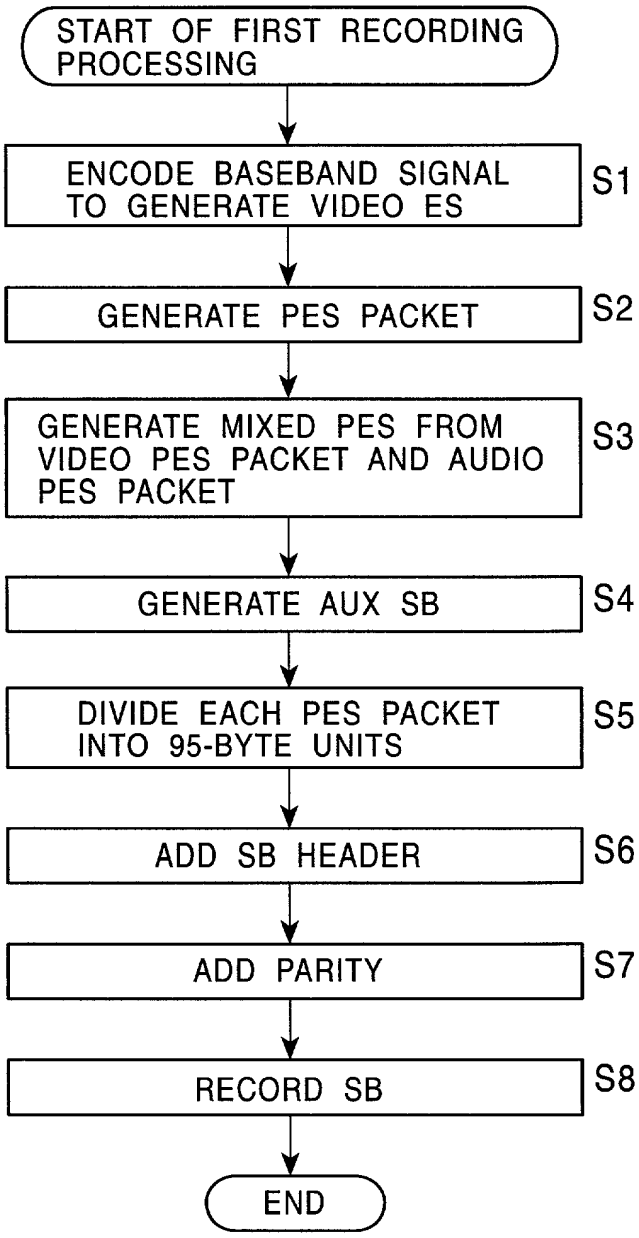

START OF FIRST RECORDING PROCESSING
ENCODE BASEBAND SIGNAL TO GENERATE VIDEO ES
S1
GENERATE PES PACKET
S2
GENERATE MIXED PES FROM VIDEO PES PACKET AND AUDIO PES PACKET
S3
GENERATE AUX SB
S4
DIVIDE EACH PES PACKET INTO 95-BYTE UNITS
S5
ADD SB HEADER
S6
ADD PARITY
S7
RECORD SB
S8
END

FIG. 16

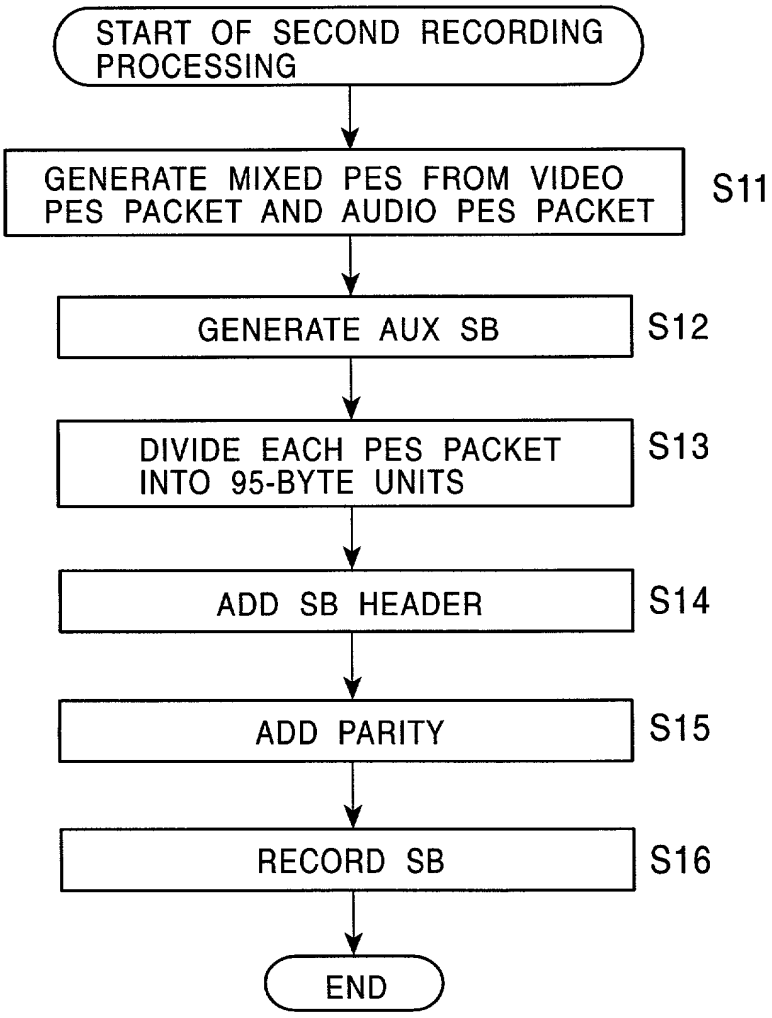

START OF SECOND RECORDING PROCESSING
GENERATE MIXED PES FROM VIDEO PES PACKET AND AUDIO PES PACKET
S11
GENERATE AUX SB
S12
DIVIDE EACH PES PACKET INTO 95-BYTE UNITS
S13
ADD SB HEADER
S14
ADD PARITY
S15
RECORD SB
S16
END

FIG. 17

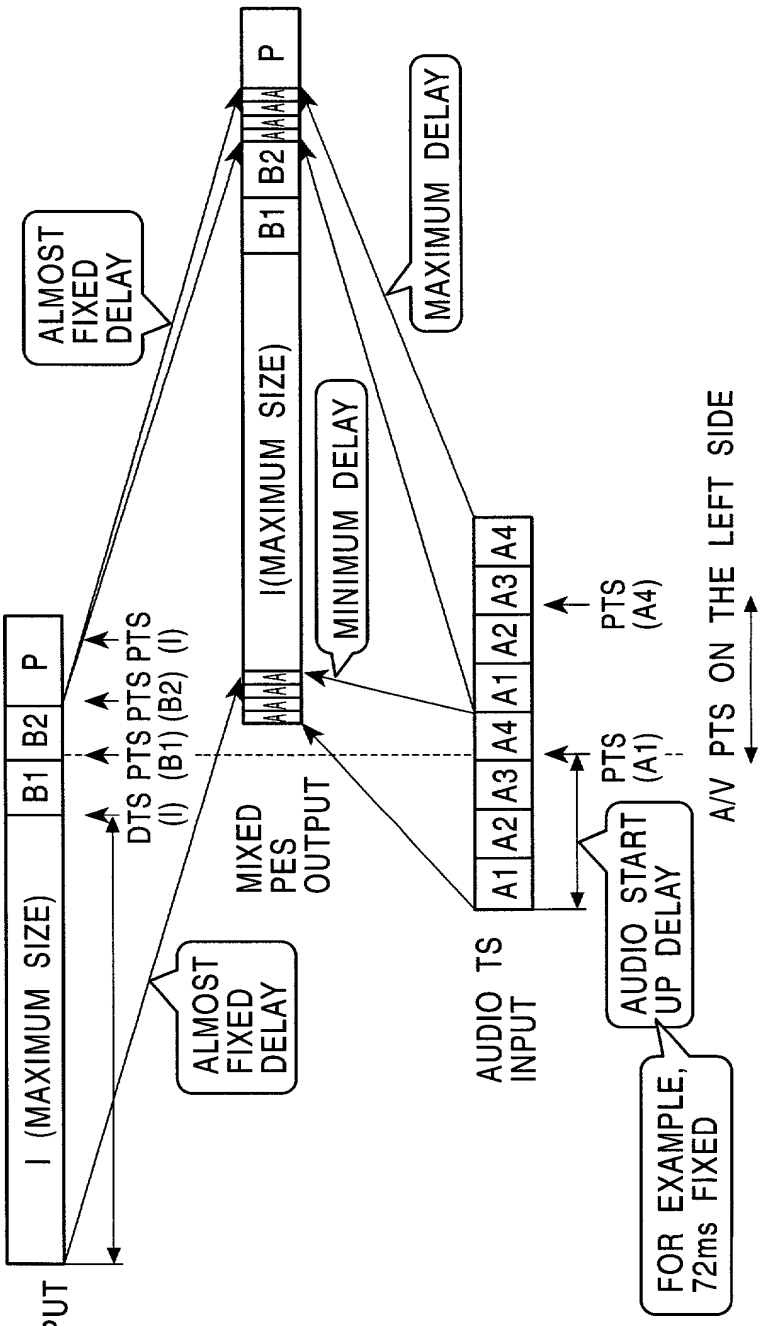

VIDEO TS INPUT
I (MAXIMUM SIZE)
B1
B2
P
ALIGN VIDEO PTS WITH AUDIO PTS
DTS (I)
PTS (B1)
PTS (B2)
PTS (I)
ALMOST FIXED DELAY
ALMOST FIXED DELAY
MIXED PES OUTPUT
I(MAXIMUM SIZE)
B1
B2
P
MINIMUM DELAY
MAXIMUM DELAY
AUDIO TS INPUT
A1
A2
A3
A4
A1
A2
A3
A4
PTS (A1)
PTS (A4)
AUDIO START UP DELAY
FOR EXAMPLE, 72ms FIXED
A/V PTS ON THE LEFT SIDE

FIG. 18

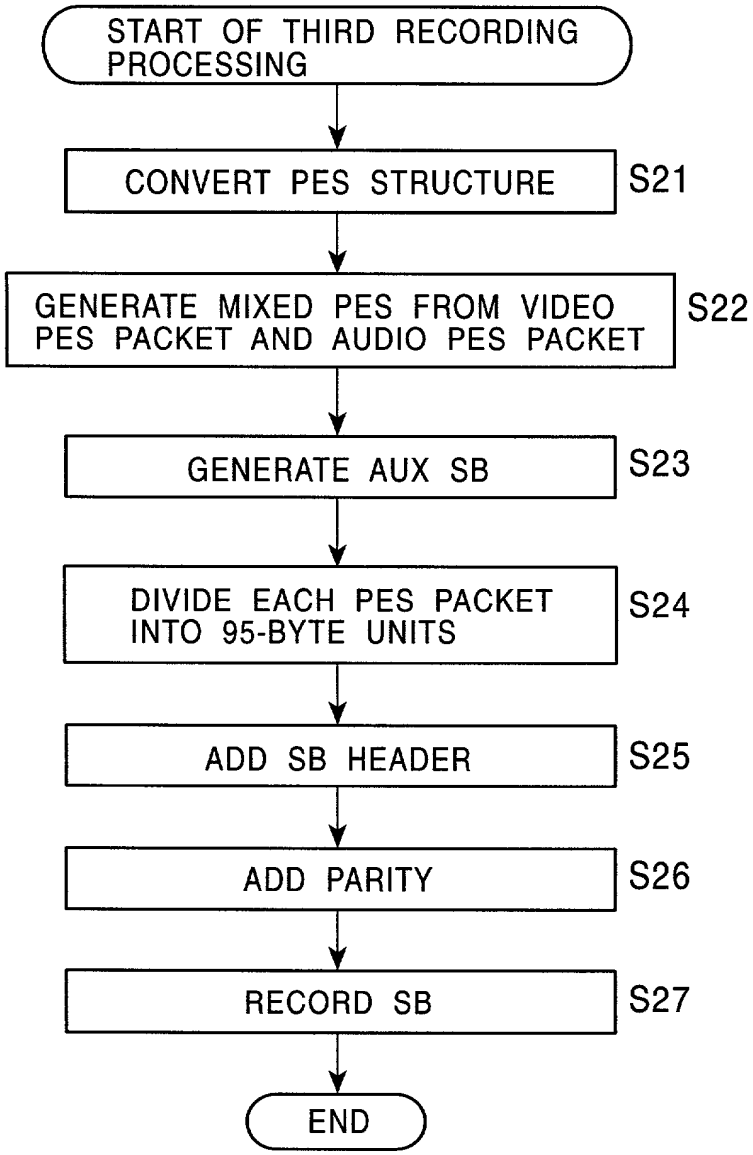


FIG. 19

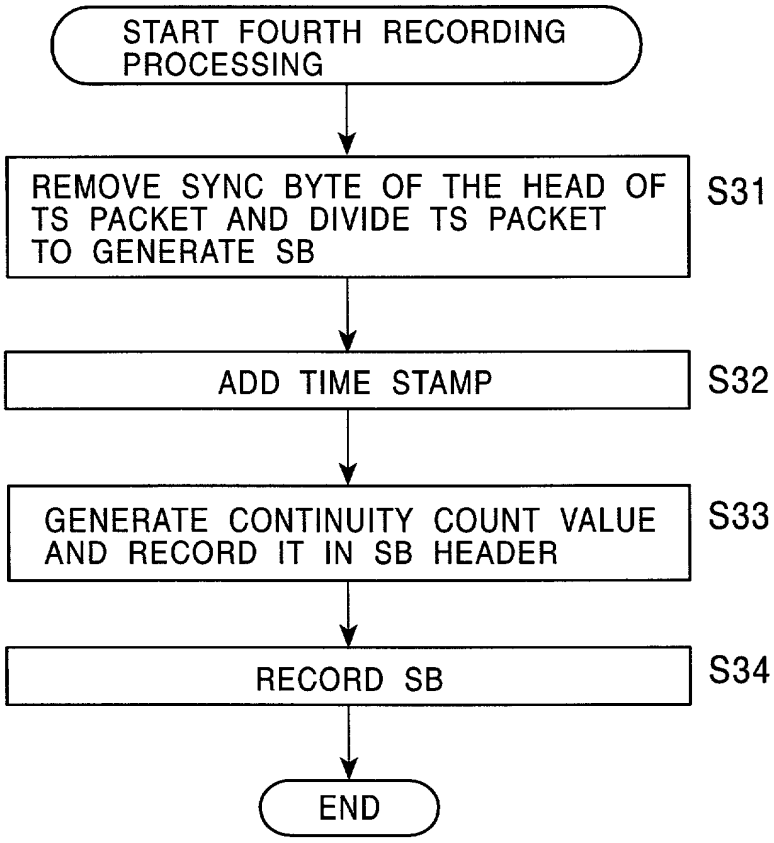

START FOURTH RECORDING PROCESSING
REMOVE SYNC BYTE OF THE HEAD OF TS PACKET AND DIVIDE TS PACKET TO GENERATE SB
S31
ADD TIME STAMP
S32
GENERATE CONTINUITY COUNT VALUE AND RECORD IT IN SB HEADER
S33
RECORD SB
S34
END

FIG. 20

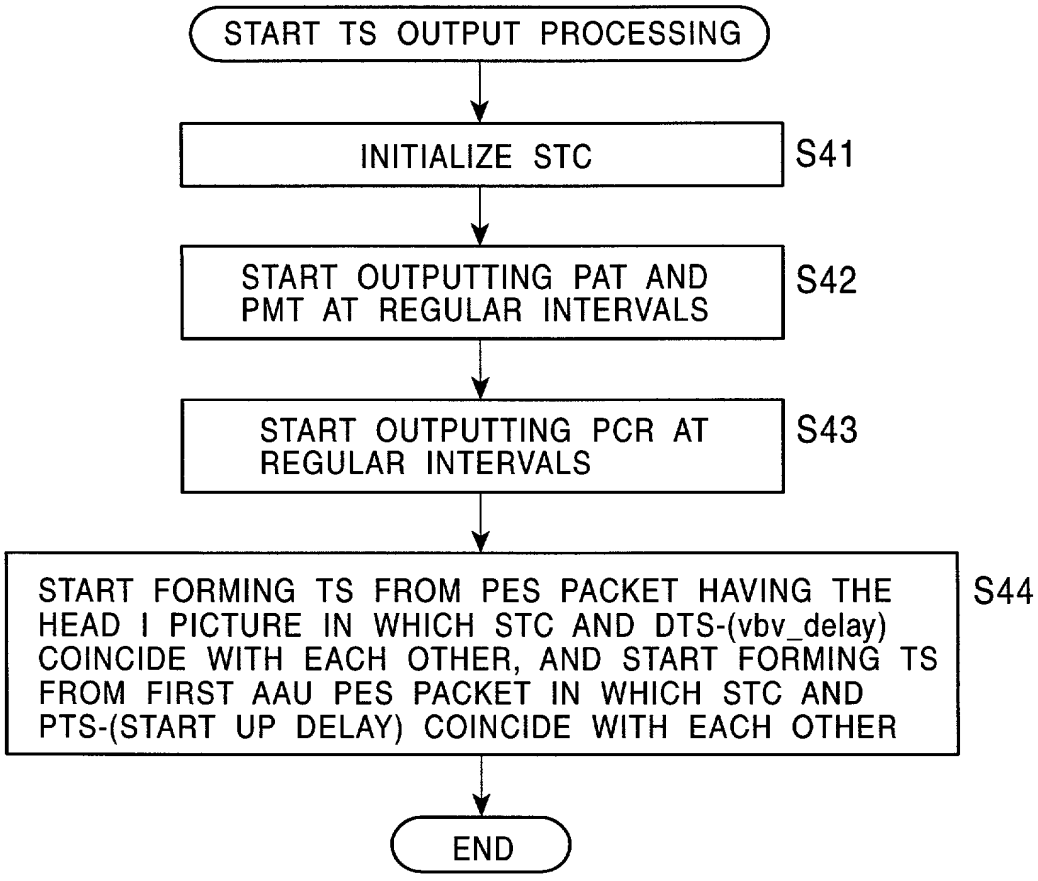

START TS OUTPUT PROCESSING
INITIALIZE STC
S41
START OUTPUTTING PAT AND PMT AT REGULAR INTERVALS
S42
START OUTPUTTING PCR AT REGULAR INTERVALS
S43
START FORMING TS FROM PES PACKET HAVING THE HEAD I PICTURE IN WHICH STC AND DTS-(vbv_delay) COINCIDE WITH EACH OTHER, AND START FORMING TS FROM FIRST AAU PES PACKET IN WHICH STC AND PTS-(START UP DELAY) COINCIDE WITH EACH OTHER
S44
END

FIG. 21

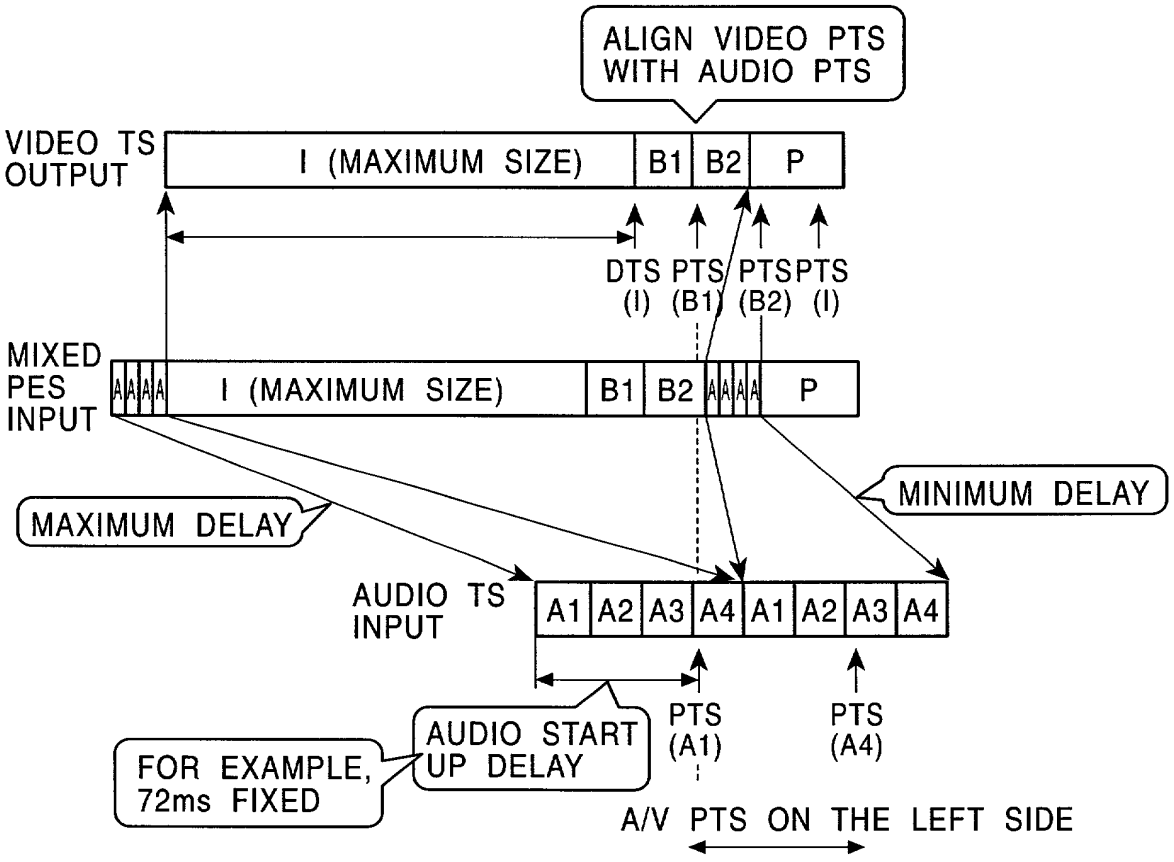

ALIGN VIDEO PTS WITH AUDIO PTS
VIDEO TS OUTPUT
I (MAXIMUM SIZE)
B1
B2
P
DTS (I)
PTS (B1)
PTS (B2)
PTS (I)
MIXED PES INPUT
AAAA
I (MAXIMUM SIZE)
B1
B2
AAAA
P
MAXIMUM DELAY
MINIMUM DELAY
AUDIO TS INPUT
A1
A2
A3
A4
A1
A2
A3
A4
AUDIO START UP DELAY
FOR EXAMPLE, 72ms FIXED
PTS (A1)
PTS (A4)
A/V PTS ON THE LEFT SIDE

FIG. 22

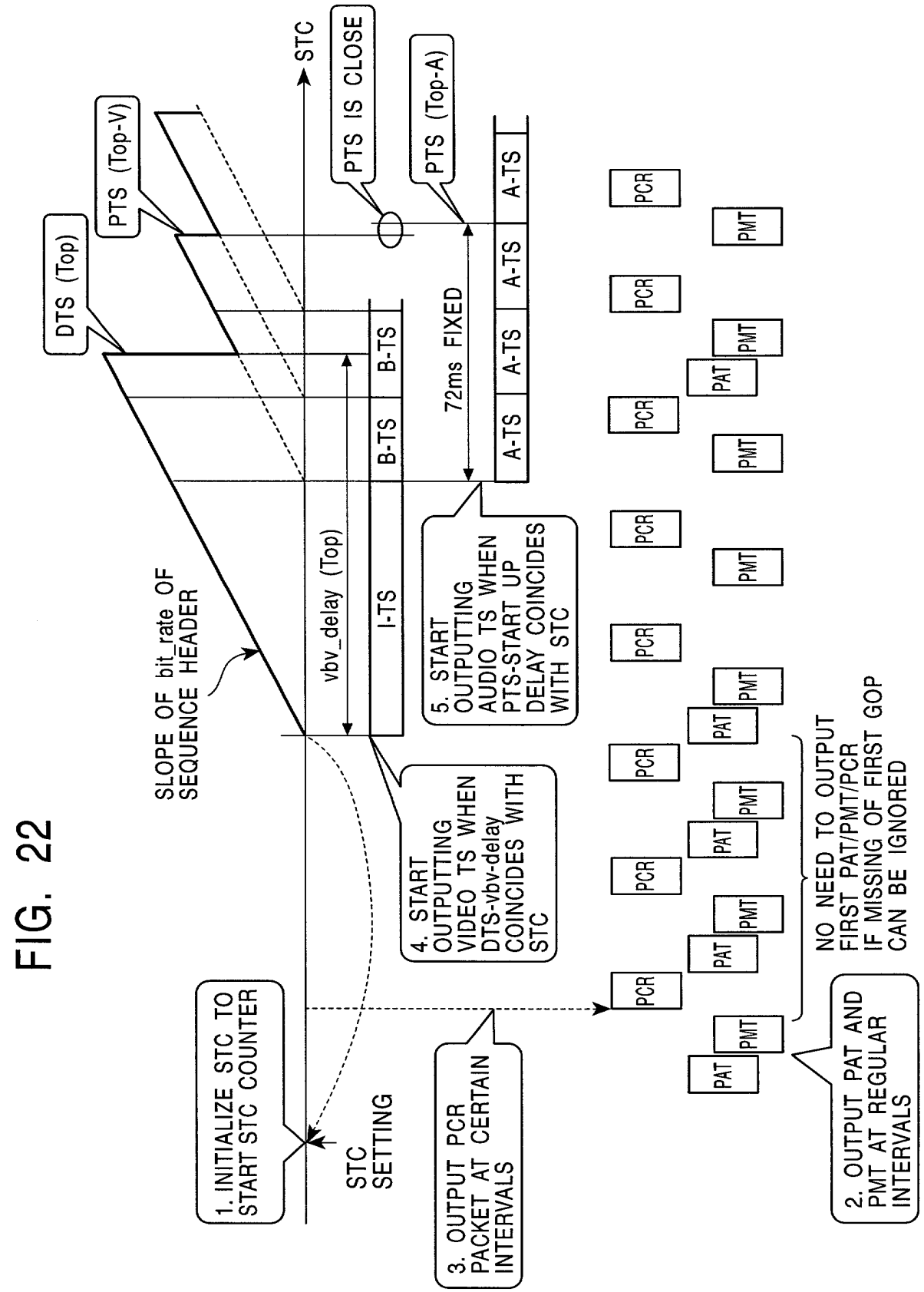

STC
DTS (Top)
PTS (Top-V)
PTS IS CLOSE
PTS (Top-A)
SLOPE OF bit_rate OF SEQUENCE HEADER
vbv_delay (Top)
I-TS
B-TS
B-TS
A-TS
A-TS
A-TS
A-TS
72ms FIXED
1. INITIALIZE STC TO START STC COUNTER
STC SETTING
3. OUTPUT PCR PACKET AT CERTAIN INTERVALS
4. START OUTPUTTING VIDEO TS WHEN DTS-vbv-delay COINCIDES WITH STC
5. START OUTPUTTING AUDIO TS WHEN PTS-START UP DELAY COINCIDES WITH STC
2. OUTPUT PAT AND PMT AT REGULAR INTERVALS
NO NEED TO OUTPUT FIRST PAT/PMT/PCR IF MISSING OF FIRST GOP CAN BE IGNORED
PCR
PAT
PMT

FIG. 23

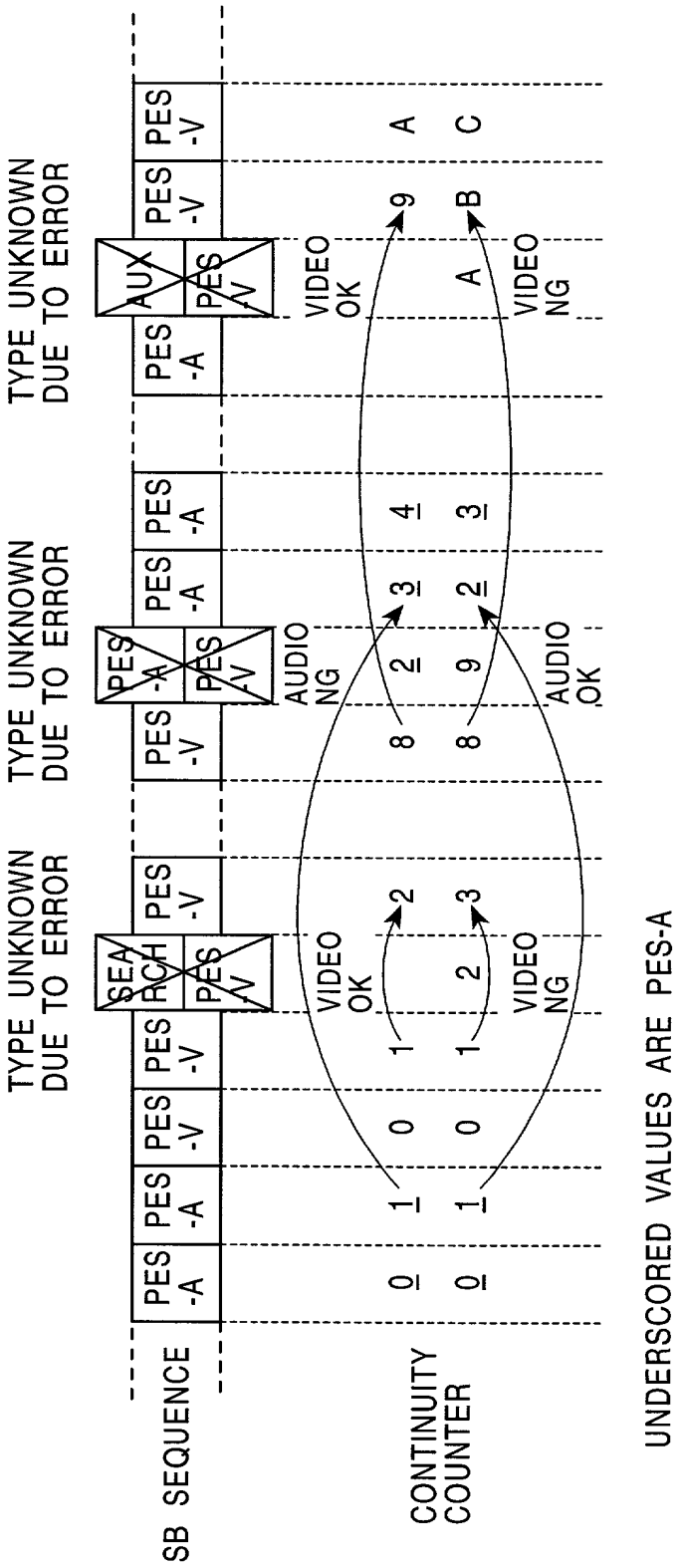
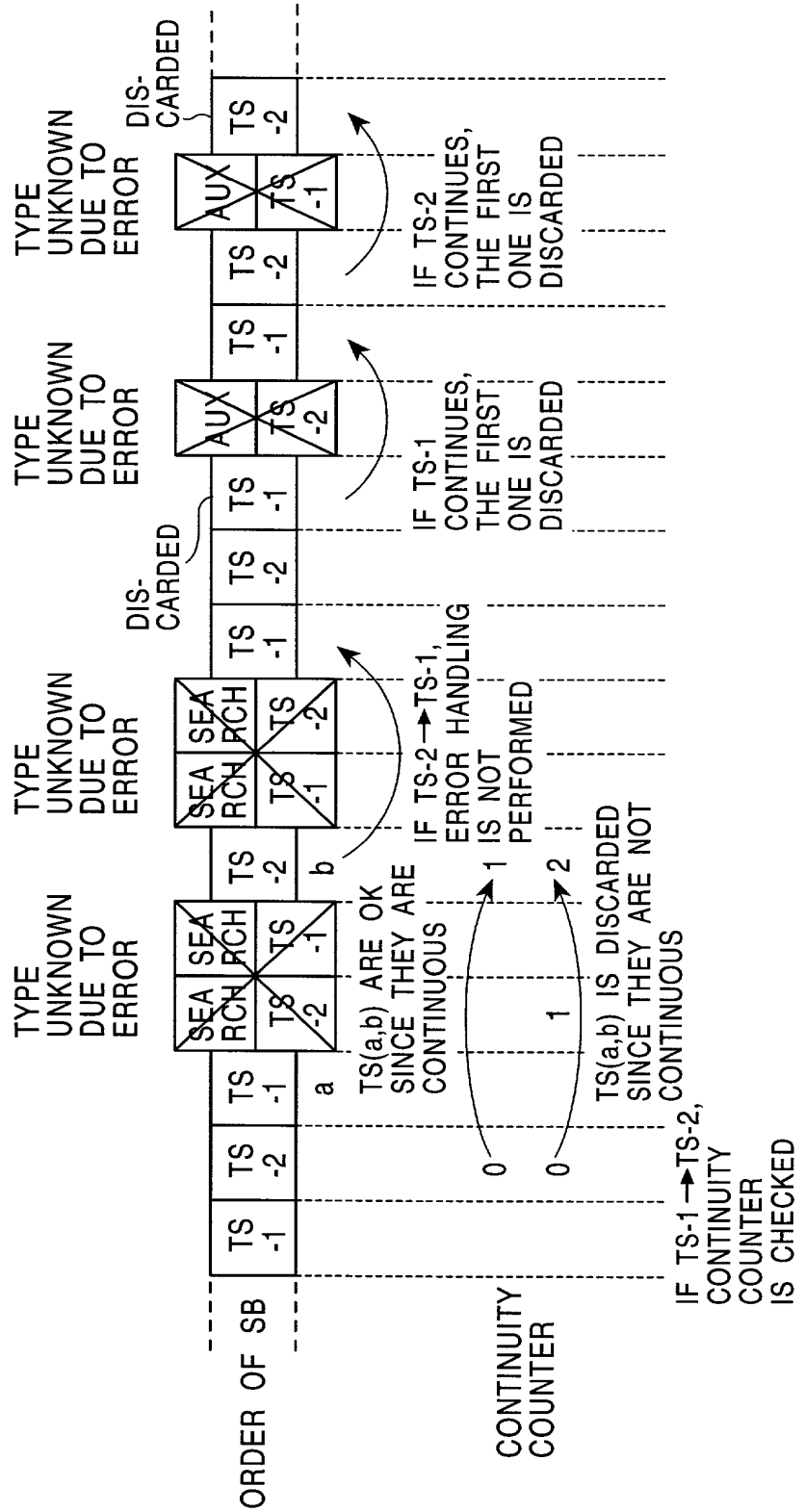

TYPE UNKNOWN DUE TO ERROR
TYPE UNKNOWN DUE TO ERROR
TYPE UNKNOWN DUE TO ERROR
SB SEQUENCE
PES -A
PES -V
SEARCH PES V
AUX PES V
VIDEO OK
VIDEO NG
AUDIO NG
AUDIO OK
CONTINUITY COUNTER
UNDERSCORED VALUES ARE PES-A

FIG. 24


ORDER OF SB
TS -1
TS -2
TS -1
a
SEA RCH
TS -2
SEA RCH
TS -1
TYPE UNKNOWN DUE TO ERROR
TS -2
b
SEA RCH
TS -1
SEA RCH
TS -2
TYPE UNKNOWN DUE TO ERROR
DIS-CARDED
TS -1
TS -2
AUX
TS -1
TYPE UNKNOWN DUE TO ERROR
DIS-CARDED
TS -2
AUX
TS -1
TYPE UNKNOWN DUE TO ERROR
DIS-CARDED
TS -2
CONTINUITY COUNTER
0
1
2
0
1
TS(a,b) ARE OK SINCE THEY ARE CONTINUOUS
IF TS-2→TS-1, ERROR HANDLING IS NOT PERFORMED
TS(a,b) IS DISCARDED SINCE THEY ARE NOT CONTINUOUS
IF TS-1→TS-2, CONTINUITY COUNTER IS CHECKED
IF TS-1 CONTINUES, THE FIRST ONE IS DISCARDED
IF TS-2 CONTINUES, THE FIRST ONE IS DISCARDED